the literature of this department of botany. Why cannot some of our publishers secure the translation of this work?——The late Professor Parlatore, before his death, had planned a work on the Comparative Anatomy of Aquatic Plants, which unfortunately was left unfinished. The fragmentary work consisting of nine fine plates showing figures of cross and longitudinal sections of different organs, together with explanatory text, has been published in Florence under the title of *Tavole per una "Anatomia della piante acquatiche."* Species of *Alisma*, *Callitriche*, *Ceratophyllum*, *Hippuris*, *Myriophyllum*, *Naias*, *Nelumbium*, *Nuphar*, *Nymphæa*, *Potamogeton*, *Trapa*, *Vallisneria*. *Victoria*, and many other phanerogams, and of *Isetes*, *Marsilia* and *Pilularia* among vascular cryptogams, are included in the figures.——Dr. Karl Kraus' observations upon the flow of sap from cut surfaces of plants, promise when completed, to throw light upon the poorly understood subject of the movement of fluids in plants. The sieve tissue of the fibrovascular bundle appears to conduct fluids most abundantly, although other tissues can act as conductors, as the fibrous envelope of some bundles, and the immature trachery tissue of others. Even collenchyma may serve as a conducting tissue. Mature vessels (tracheary) conduct no sap, and parenchyma does so only when sap is exceedingly abundant.

ZOÖLOGY.

THE CŒLOMA THEORY.—Since Haeckel's publication of his Gastræa theory, the most important generalization in embryology is the Cœloma theory of the brothers Hertwig.[1] It is an expression of the history of the nature and changes of the middle layer of the blastoderm.

They define two types of middle layer as follows: In the first, it is formed of separate cells which wander from the epiblast and hypoblast, which in some instances appear round the mouth of the gastrula. This they call the *mesenchym*. In the second type, the layer is divided as two strata of cells from the epiblast. To this form they restrict the name *mesoblast*. Moreover in the animals which present the mesenchym, there is a cavity between the epiblast and hypoblast, which is not the true body-cavity. Such are the Plathelminths (flat worms) Bryozoa and Mollusca. To this series they give the name of *Pseudocœlia*. The echinoderms, brachiopods, round worms, arthropods and vertebrates possess a mesoblast. Here the two layers of the mesoblast separate and form the walls of the body cavity, which is divided by the intestine into two chambers. To this division is given the name of the *Enterocœlia*. Animals are thus divided into two divisions, those in which the blastoderm consists of two layers, and those in which it is formed of four layers.

The consequences of these modes of origin are seen in charac-

[1] Jenaische Medicinische Zeitung. 1881.

teristic structures of the adult. Thus in the *Mollusca* the vessels of the circulatory system are diverticula of the general body-cavity with which they freely communicate. On the other hand the circulating vessels of the *Enterocœla* never communicate with the body-cavity, but originate from the digestive system, or independently. In the *Pseudocœlia* the nervous system is derived from the mesenchym, except perhaps the supraœsophageal ganglia of Mollusca. In the *Enterocœla*, on the other hand, the central system is developed from the epiblast, and the peripheral system from the epiblast and external layer of the mesoblast.

THE TORTOISES OF TUCSON.—There are two land tortoises and a fresh-water turtle found here that are not given in the list of reptiles for Southern California, by Dunn and Fisher, published in the April number of AMERICAN NATURALIST.

One of the terrestrial tortoises[1] resembles at first glance the common box tortoises, *Cistudo virginiana*, but differs in the ornamentation of the plates on the carapax and on the sternum. The whole exoskeleton is marked with brown and yellow stripes and spots; brown predominating on the carapax and yellow on the sternum.

The only specimen in my possession I found crossing the road seventy miles south of Tucson, in Pima county, Arizona, some distance from permanent water. My specimen is five and a-half inches long, four inches broad and two and three-quarters inches high.

The other land tortoise is a large animal.[2] This fellow is found on the basaltic mountains in the most arid parts of this dry country. He is a vegetarian, feeding, as I am told, on cacti. His flesh is highly esteemed as food by the Indians and Mexicans. You will perceive that his mandibles are notched or toothed. His legs are covered with bony scales, and his front toe nails are made long and strong for digging amongst the rocks, while the hind feet are round like an elephant's.

When molested he draws in his head and closes the aperture with his legs by bringing the knees together in front of the head; the hind legs are also drawn in until the posterior spaces are closed by the feet, and in this way all vulnerable parts are protected by impenetrable armor. In preparing the specimen, I found on each side, between the flesh and carapax, a large membranous sack filled with clear water; I judged that about a pint run out, though the animal had been some days in captivity and without water before coming into my possession. Here then is the secret of his living in such a dry region; he carries his supply of water in two tanks. The thirsty traveler, falling in with one of these tortoises and aware of this fact, need have no fear of dying for immediate want of water.

[1] *Cistudo ornata* Agass.
[2] *Xerobates agassizi* Cooper.

The fresh-water turtle[1] is found in the Santa Cruz river at Tucson. This is a small stream about twenty feet wide at low water; it rises in Arizona, on the east side of Patagonia mountains, flows southerly into Sonora, Mexico, then turns northward and again enters Arizona between the Santa Rita and Oro Blanco mountains. The water sinks beneath the surface for the greater part of its course, except in the rainy season, and is only a flowing stream for a short distance at this place, and is supposed to empty into the Gila river, near Maricopa wells.—*E. T. Cox.*

INTELLIGENCE OF A CAT—Several years ago my grandfather moved from his farm into this city. Among the domestic animals on the place at that time was an old cat with one small kitten. These they intended to leave, placing the kitten in a room where a broken pane of glass would allow the cat to pass back and forth at will. The last load was nearly ready to start, when my father, who was making some final preparations, was attracted by an exclamation of surprise from his mother, and looking around he beheld the cat strutting along with the kitten dangling from her mouth. Without any interference on the part of the ladies, who were on the wagon, or by any member of the family, she marched directly to the load, and after surveying it a moment, jumped upon it, where, after a short search, she chose an inverted table and placed her charge in it. It is, perhaps, unnecessary to add that she was not left at the farm.

This story has a double charm for me. In the first place I know it to be true; secondly, it shows remarkable intelligence in the subject of it. We all know how watchful a cat is of her kittens and how eager she is to carry them back when removed from their bed, so it seems altogether out of the usual course when one, of her own accord, removes, as this one did, knowing undoubtedly that they were to be taken away.—*N. H. Hurd.*

MIGRATION OF BIRDS.—One of the most interesting reports presented to the last meeting of the British Association, was that of the committee on the migration of birds. Observations have been received from 103 lighthouses and lightships, which show that the migration of one species of birds or another is almost continually going on; but the great migrations are in the autumn and spring. From the facts gathered at lighthouses and lightships, it appears certain that many thousands of birds must perish at sea. The white fixed lights attract the greater number of birds, the mortality at Skerryvore for October, 1877, amounting to no fewer than 600, chiefly, the common thrush and the ring-ousel. Revolving lights are also fatally attractive, for at the Casquets, during the four hours from 11 P. M. to 3 A. M., October 7, with the wind S.S.E. and rain, land-rails, water-rails, woodcocks, ring-ousels, song

[1] A species of Cinosternum.—*Ed.*

thrushes, and swallows, were seen around the light, and of these there struck the glass and killed themselves, one land-rail, one water-rail, four ring-ousels, and no fewer than 100 swallows. The larger birds do not often strike the glass in the revolving lights, but follow the rays. So far the observations show that all birds, with few exceptions, are migatory—even sparrows, which invariably leave Heligoland before the end of September.

SUDDEN INTEREST IN JAPANESE ORNITHOLOGY.—In the report of some difficulties encountered by a well known library in New York, in their efforts to meet the public taste, we find a reference to an ornithological work which is as new to us as the reported interest in that science is surprising. The *Herald* says:

"President P. said that the management has spent three dollars for standard works to every dollar that has been expended on novels. The demand for the 'Birds of Japan' was so great that the directors had to buy sixty copies; and for other costly works the demand exceeded the directors' ability."

Perhaps one of the readers of "Unbeaten Tracks" may give us the means of properly classifying the ornithological specimen referred to.—*W. H. Dall.*

ASILUS AND LIBELLULA.—So far as I am aware, robber-flies are not credited with capturing prey larger than themselves. But last August my attention was attracted, one day, by a medium sized dragon-fly fluttering on the ground, and looking closely I saw a robber-fly, about three-fourths of an inch in length, quietly clinging to his body just under the right fore-wing, and sucking his blood. Haste forbade my waiting for the end of the struggle, but the issue was not uncertain.—*J. E. Todd, Tabor College, Iowa.*

TERNS AS FLY-CATCHERS.—Last August, near Fort Sisseton, D. T., I noticed many black gulls *(Hydrocheilodon lariformis)* in the air catching dragon-flies. They appeared to catch them by their tails, and after several pinches with the bill, with a raise of the head they gulped them down. All this was done very gracefully, while they were on the wing.—*J. E. Todd.*

SPECIMENS OF MELANTHO WANTED.—Sets of from five to ten specimens each, of all the species of the genus Melantho, from every available locality. Please correspond with R. Ellsworth Call, 1722½ Woodland avenue, Des Moines, Iowa. Liberal exchanges will be given in Strepomatidæ or Unionidæ. Material is wanted *at once.* Any specimens with the animal either dried or in alcohol especially desired.

ZOOLOGICAL NOTES.—Some of the causes affecting the decrease in the number of our birds are discussed by Mr. H. W. Henshaw, in the Bulletin of the Nuttall Ornithological Club for October. Besides the effects of disease, accident, the attacks of other animals, which probably act as but a slight check in the increase

of birds, Mr. Henshaw mentions telegraph wires, and storms, the effects of which are pretty well known. Foggy and tempestuous weather, during which birds are dashed against lighthouses or are carried out to sea and drowned, cause widespread destruction among birds, and this occurs on the great lakes as well as on the ocean, and Mr Henshaw concludes that the "ocean's victims annually reach such figures as to affect the numerical relation of species over extensive areas."——In the same journal, Dr. Shufeldt records the discovery of a supposed new bone in the wing of a hawk *(Circus hudsonius)* which he calls the *os prominens*, but would not consider as a carpal bone.——A supposed new boring Annelid found injuring the iron wire of a submarine cable off Singapore, is described and figured by C. Stewart, in the Journal of the Royal Microscopical Society, for October.——The vinegar worm *(Anguillula aceti)* and its allies have been treated monographically, by Dr. L. Oerley; to show how little these animals need a special respiratory apparatus, a number of the vinegar worms were placed in a vessel and covered by a layer of oil an inch thick; after two months the greater number were still alive.—— The development of the liver fluke has been studied by Mr. A. P. Thomas, who states that the embryo can only develop at a temperature lower than that of the mammalian body. The number of eggs produced by a single fluke "may be safely estimated at several hundred thousand."——The sea-urchins are being, in part, revised by F. J. Bell, in the Proceedings of the Zoological Society of London.——The one-celled animals, or Infusoria, especially, have been examined by C. Robin, to see whether the notion of a cell is sufficient to include everything in both elementary anatomy and physiology, and thinks that one-celled organisms "possess other things than those which occur under the form of cells." For example, *Podophrya lyngbyei*, in the larval stage, is a good example of both an anatomical and physiological unit. But it is certain that by virtue of their peduncle, of their theca which is separable from it, and of the body, which is separable from the theca, the adults of Podophyra, and the Acinetæ, in general, are Protozoa in which are found at least two kinds of anatomical and physiological units, the one of these, namely the non-contractile theca and its peduncle, is subordinate to the others, the sarcode body, and it remains essentially different from it in anatomical and physiological characters.——A very full account of the Protozoa inhabiting man is given by Leuckart, in the second edition of his work on human parasites. He regards the psorosperms as constituting a new class, which he calls *Sporozoa*. Grassi, in an Italian journal, also enumerates the Protozoa found by him, chiefly in man. The list is sufficiently formidable.——Mr. Darwin's book on the earth-worm, shows what a vast work is done by worms in altering vegetable into what he calls "animal mould." He also shows that worms are sensitive to light, to vibrations of any solid object

with which they may be in contact, that they can smell natural food, have a sense of taste for food, but that the sense of touch is most highly developed. Worms are omnivorous, eating meat as well as leaves. How great quantities of leaves they drag under the ground, and how they undermine stones, and triturate in their stomachs small particles of stone, and thus act as geological agents is shown in this remarkable book.

ENTOMOLOGY.[1]

RETARDED DEVELOPMENT IN INSECTS.[2] — In this paper the author records several interesting cases of retarded development in insects, whether as summer coma or dormancy of a certain portion of a given brood of caterpillars, the belated issuing of certain imagines from the pupa or the deferred hatching of eggs. One of the most remarkable cases of this last to which he calls attention, is the hatching this year of the eggs of the Rocky Mountain locust, or western grasshopper *(Caloptenus spretus)* that were laid, in 1876, around the Agricultural College at Manhattan, Kans. These eggs were buried some ten inches below the surface in the fall of 1876, in grading the ground around the chemical laboratory. The superincumbent material was clay, old mortar and bits of stone, and a plank sidewalk was laid above all. In removing and regrading the soil last spring, Mr. J. D. Graham noticed that the eggs looked sound and fresh, and they readily hatched upon exposure to normal influences, the species being determined by Professor Riley from specimens submitted by Mr. Graham. Remarkable as the facts are, there can be no question as to their accuracy, so that the eggs actually remained unhatched during nearly four years and a half, or four years longer than is their wont, and this suggests the significant question: How much longer could the eggs of this species, under favoring conditions of dryness and reduced temperature, retain their vitality and power of hatching?

Putting all the facts together, Mr. Riley concludes that we are, as yet, unable to offer any very satisfactory explanation, based on experiment, of the causes which induce exceptional retardation in development among insects. It is a very general rule that a rising temperature stimulates and accelerates growth, while a falling temperature retards and torpifies, and experiments recorded by the author[3] show that such is the case with regard to the eggs of *Caloptenus spretus*. But there are many strange exceptions to the rule. The eggs of crustaceans, as Apus and Cypris, are known to have the power of resisting drouth for six, ten or more years without losing vitality, while in some

[1] This department is edited by PROF. C. V. RILEY, Washington, D. C., to whom communications, books for notice, etc., should be sent.

[2] Abstract of a paper read before the Entomological Section of the A. A. A. S. at Cincinnati.

[3] 9th Rep. Ins. Mo.; also 1st Rep. U. S. Ent. Com.